CENWS-PM-PL-ER 23 July 2004

MEMORANDUM FOR Record

SUBJECT: Codiga Farms Baseline Monitoring Report

1. Staff from the Environmental Resources Section, Seattle District COE conducted baseline environmental surveys of the Codiga Farms side-channel restoration site in Tukwila, WA on 22 July 2004. Personnel were Philip L. Hoffman, Biologist; Torrey Luiting, Biologist; Lisa Sievers, Biological Technician. The purpose of the effort was to 1) document fish presence/use, species composition and individual size; 2) document initial vegetation community, species composition, and percent cover; 3) determine current maintenance needs and status of the site; 4) establish repeatable photo points and vegetative sampling plot for future monitoring.

2. **Fish Community:** Fish sampling was undertaken using a Seattle District Fike net. The net has a frame size of approximately 4 feet by 5 feet, and adjustable wings. The net was set at the lower end of the mid-channel log zone, in approximately 4 feet of water at 0917 (High Tide @ 8th Avenue South for the day was +8.2 @ 0849, dropping to +0.9 @1457) and fished until the site was drained at 1223. There were 649 fish caught, in 4 species. Three-spine stickleback were the dominant species by number (618); 18 starry flounder in size range from 58mm to 80mm; 2 juvenile Chinook salmon (51 and 59 mm) and 1 sculpin at 109mm comprised the catch.

3. **Goose Excluder Function:** The goose excluder, as constructed, is functioning very well. As the attached photo, below, shows, plants placed outside the goose excluder have been consumed, while plants within the excluder are robust and thriving. There is extensive "evidence" of use of the project site by Canada geese, and we believe they would be consuming the marsh plants without the proper protection. Of particular interest is the success of the nylon/plastic-webbed tape used for the top of the structure. This tape, Pacstrap P40RW Polyester Cord Strapping, has proven to mimic "Scare Tape". We recommend it be used in future restoration projects for goose exclusion (Specifications are attached at the end of this document).

4. **Photo Points:** We established four permanent photo points from which photos documenting the development of the site should be taken during all subsequent monitoring efforts. All photo points are approximately 4-foot tall wooden lathe with pink flagging. Each is labeled with the photo point number. Photo Point 1 is located at the northern end of the site, Photo Point 2 on the eastern side of the site, Photo Point 3 at the southeastern end of the site, and Photo Point 4 on the western side of the site. See attached drawing for approximate location of photo points and vegetation sampling plots.

**5. Vegetation Community:** We established 11 vegetation-sampling plots across the site to document the development of the planted vegetation and the establishment of volunteer vegetation. At each sample plot, we used an approximately 4-foot wooden lathe to mark the center of the plot and then recorded the species, number, and percent cover of all species within the plot. Plots 1 through 5 were established within the emergent marsh area and are 10-foot

radius, circular plots centered on the wooden stake. Plots 6 through 11 are located within the riparian and upland vegetation areas and are rectangular plots (to best reflect the linear nature of these areas) approximately 8 feet wide by 15 feet long, centered on the wooden stake. Plot locations are illustrated in the attached drawing; species richness and percent coverage is described in Table 1. Table 2 presents the numbers of trees and shrubs within each plot; emergent plants were not counted individually due to density.

The data collected during this baseline or post-construction condition will be compared to subsequent monitoring efforts as the site develops to determine species survival, changes in percent cover, and establishment of native and/or invasive volunteer vegetation species. We noted that the emergent vegetation on the higher, western portion of the marsh bench was less dense and supported a greater density of upland associated species (such as clover) than the lower, eastern portion of the marsh. We also noted and removed one cattail from the western portion of the marsh bench.

**6. Maintenance Needs:** Numerous invasive and weedy species were observed within the site. Himalayan blackberry is rapidly encroaching on the upland planting areas on the western peninsula. In addition, Japanese knotweed and morning glory have also reinvaded and/or volunteered to the southern and eastern portions of the site, respectively. One common cattail was removed from the emergent vegetation zone along the western side of the site. These invasive exotic species will smother, shade, and otherwise out compete the native trees, shrubs, and emergent plantings unless diligently controlled at the earliest stages of infestation. These plants need to be removed as soon as possible, with repeated removal actions performed on a regular schedule. The biological and financial costs of failing to control invasive species increases exponentially as they become more established. The ultimate result of failure to control these species during the initial establishment phase of a restoration project is the death of the planted trees, shrubs, and emergent species and the ecological failure of the restoration site to provide native habitats and functions to this portion of the river.

***/s/*** ***/s/***

Philip L. Hoffman, Victoria Luiting
Project Biologists

**Figure 1.** Photo point pictures established 22 July 2004 at the Codiga Farms Side Channel Restoration Project, Tukwila, Washington.

**Figure 2.** Invasive/weedy plants requiring removal/maintenance at the Codiga Farms Side Channel Restoration Project, Tukwila, WA

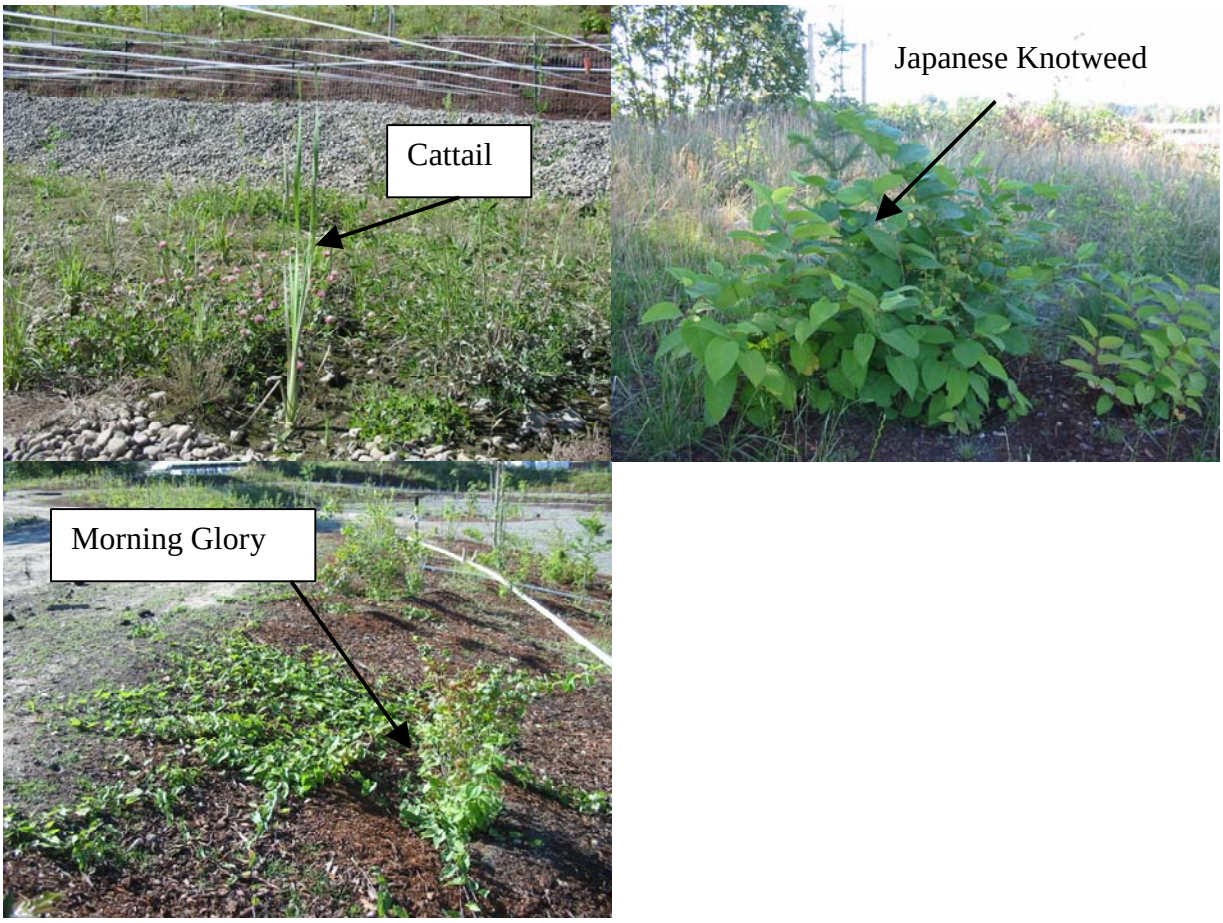
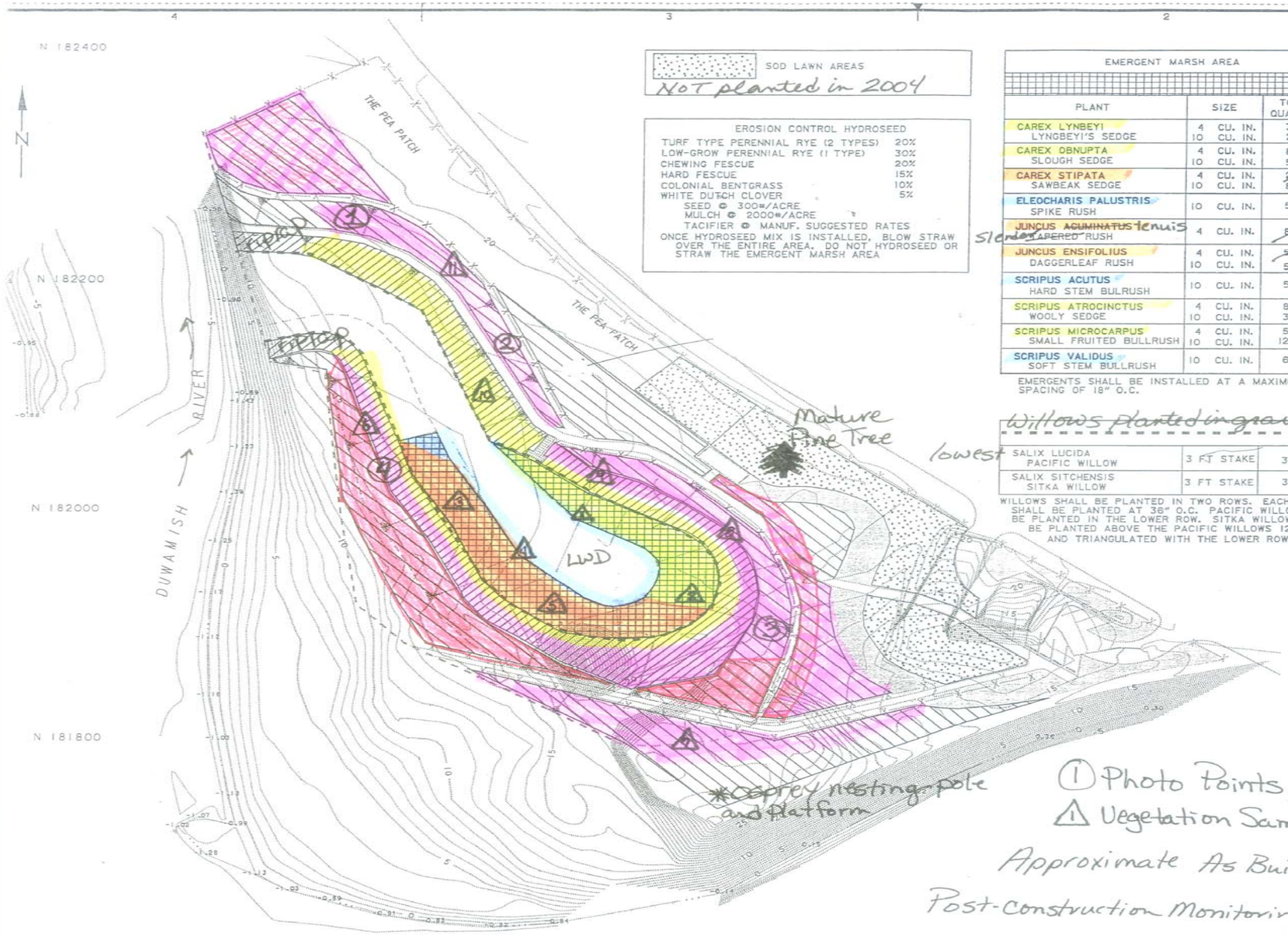


**Figure 3.** Edge of goose excluder, showing difference in condition of areas planted within and outside the excluder; from the Codiga Farms Side Channel Restoration Project, Tukwila Washington.

Planted By Colored Zon




SOD LAWN AREAS
NOT planted in 2004

EROSION CONTROL HYDROSEED

| | |
|---|---|
| TURF TYPE PERENNIAL RYE (2 TYPES) | 20% |
| LOW-GROW PERENNIAL RYE (1 TYPE) | 30% |
| CHEWING FESCUE | 20% |
| HARD FESCUE | 15% |
| COLONIAL BENTGRASS | 10% |
| WHITE DUTCH CLOVER | 5% |

SEED @ 300#/ACRE
MULCH @ 2000#/ACRE
TACIFIER @ MANUF. SUGGESTED RATES
ONCE HYDROSEED MIX IS INSTALLED, BLOW STRAW OVER THE ENTIRE AREA. DO NOT HYDROSEED OR STRAW THE EMERGENT MARSH AREA

EMERGENT MARSH AREA

| PLANT | SIZE | TOTAL QUANTITY |
|---|---|---|
| CAREX LYNBEYI LYNGBEYI'S SEDGE | 4 CU. IN.<br>10 CU. IN. | 300<br>200 |
| CAREX OBNUPTA SLOUGH SEDGE | 4 CU. IN.<br>10 CU. IN. | 800<br>500 |
| CAREX STIPATA SAWBEAK SEDGE | 4 CU. IN.<br>10 CU. IN. | ~~200~~ 400<br>800 |
| ELEOCHARIS PALUSTRIS SPIKE RUSH | 10 CU. IN. | 500 |
| JUNCUS ~~ACUMINATUS~~ tenuis slender ~~TAPERED~~ RUSH | 4 CU. IN. | ~~800~~ 400 |
| JUNCUS ENSIFOLIUS DAGGERLEAF RUSH | 4 CU. IN.<br>10 CU. IN. | ~~500~~ 700<br>500 |
| SCRIPUS ACUTUS HARD STEM BULRUSH | 10 CU. IN. | 500 |
| SCRIPUS ATROCINCTUS WOOLY SEDGE | 4 CU. IN.<br>10 CU. IN. | 800<br>300 |
| SCRIPUS MICROCARPUS SMALL FRUITED BULLRUSH | 4 CU. IN.<br>10 CU. IN. | 500<br>1200 |
| SCRIPUS VALIDUS SOFT STEM BULLRUSH | 10 CU. IN. | 600 |

EMERGENTS SHALL BE INSTALLED AT A MAXIMUM SPACING OF 18" O.C.

Willows Planted in gravel

| | | |
|---|---|---|
| SALIX LUCIDA PACIFIC WILLOW | 3 FT STAKE | 300 |
| SALIX SITCHENSIS SITKA WILLOW | 3 FT STAKE | 300 |

WILLOWS SHALL BE PLANTED IN TWO ROWS. EACH ROW SHALL BE PLANTED AT 36" O.C. PACIFIC WILLOWS TO BE PLANTED IN THE LOWER ROW. SITKA WILLOWS TO BE PLANTED ABOVE THE PACIFIC WILLOWS 12 - 18" AND TRIANGULATED WITH THE LOWER ROW.

| INTERMEDIATE/UPLAND/PARK AREAS | | QUANTITY | | | |
|---|---|---|---|---|---|
| TREES | SIZE | RIPARIAN | UPLAND | PARK | TOTAL QUANTITY |
| ACER MACROPHYLLUM BIGLEAF MAPLE | 2 GAL | 30 | 30 | | 60 |
| CRATAEGUS DOUGLASII BLACK HAWTHORNE | 5 GAL | 38 | 12 | | 50 |
| MALUS FUSCA WESTERN CRABAPPLE | 5 GAL | 50 | | | 50 |
| PICEA SITCHENSIS SITKA SPRUCE | 5 GAL | 50 | | | 50 |
| POPULUS BALSAMIFERA BLACK COTTONWOOD | 2 GAL | 35 | 35 | | 70 |
| PSEUDOTSUGA MENZIESII DOUGLAS FIR | 2 GAL | 28 | 82 | | 100 |
| TSUGA HETEROPHYLLA WESTERN HEMLOCK | 1 GAL | | 20 | | 20 |
| SHRUBS | | | | | |
| ARCTOSTAYPHYLOS UVA-URSI KINNIKINNICK | 4 IN. POT | | | 200 | 200 |
| CORNUS STOLONIFERA REDTWIG DOGWOOD | 2 GAL | ~~300~~ 200 ← | | ~~100~~ | 300 |
| GAULTHERIA SHALLON SALAL | 2 GAL | | 100 | | 100 |
| HOLODISCUS DISCOLOR OCEANSPRAY | 1 GAL | ~~25~~ → ~~75~~ 100 | | | 100 |
| LONICERA INVOLUCRATA BLACK TWINBERRY | 2 GAL | 100 | | | 100 |
| MAHONIA AQUAFOLIUM OREGON GRAPE | 1 GAL | ~~12~~ → ~~25~~ 50 | | 200 | 250 |
| OEMLARIA CERASIFORMAS INDIAN PLUM | 2 GAL | 25 | 75 | | 100 |
| PHILEDLPHUS LEWISII MOCK ORANGE | 2 GAL | ~~50~~ → ~~100~~ 150 | | 100 | 250 |
| RIBES SANGINEUM RED FLOWERING CURRANT | 2 GAL | 25 | 25 | 200 | 250 |
| ROSA NUTKANA NOOTKA ROSE | 2 GAL | 200 | 100 | 200 | 500 |
| RUBUS PARVIFORIUM THIMBLEBERRY | 2 GAL | | 100 | | 100 |
| SYMPHORICARPOS ALBUS SNOWBERRY | 2 GAL | 100 | 250 | | 350 |

individually located south end
ring around pine tree

NOTES:

PLANT LAYOUT IN THE FIELD AS DIRECTED BY CORPS BIOLOGIST.

ALL PLANT PITS SHALL BE PIT PLANTED WITH A MIX OF 1/3 IMPORT COMPOSTED YARD WASTE AND 2/3 NATIVE SOIL.

ALL PLANTINGS (EXCEPT EMERGENTS AND WILLOWS) SHALL RECEIVE A MULCH RING. THIS RING SHALL BE A MINIMUM OF 2 FEET IN DIAMETER AND A MINIMUM DEPTH OF 2 INCHES. THE BARK MULCH WILL BE FINE TEXTURED OR SHREDDED.

GOOSE EXCLUDERS SHALL BE INSTALLED AROUND THE ENTIRE EMERGENT MARSH AREA PRIOR TO COMPLETION OF PLANTING.

SEE THE ATTACHED STATEMENT OF WORK DATED 10 OCTOBER 2003 FOR PLANTING NOTES.

① Photo Points, 1-4
△ Vegetation Sample Plots, 1-11
Approximate As Built Site Conditions
Post-Construction Monitoring July 22, 2004

FINAL

1" = 40' (40' 20' 0 40' 80')

REDUCED TO 50% OF FULL SIZE

U.S. ARMY ENGINEER DISTRICT, SEATTLE
CORPS OF ENGINEERS
SEATTLE, WASHINGTON

CODIGA FARMS HABITAT RESTORATION

LANDSCAPE PLAN

KING COUNTY WASHINGTON

| SIZE | INVITATION NO. | FILE NO. | DATE | PLATE |
|---|---|---|---|---|
| D | | | 15 OCT 03 | C-4 |
| DESN. JGR | | CHK. DAF | SHEET 6 | |



DATE AND TIME PLOTTED: 16-OCT-2003 09:47
DESIGN FILE: F:\CIV\CODIGA\CHANNEL MOVE OPTION\CODIGALPA.DGN

N. Whiting

Table 1: **Baseline species richness and percent cover within the 11 sampling plots at the Codiga Farms Restoration Site, Duwamish River, Tukwila Washington. Data collected July 22, 2004. Shaded rows indicate volunteer species not originally planted.**

| | | | | | | | % Cover | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Scientific Name*** | **Common Name** | **Stratum** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| *Acer macrophyllum* | Bigleaf maple | Tree | | | | | | <2 | | | | <2 | |
| *Crataegus douglasii* | Douglas hawthorn | Tree | | | | | | <2 | <1 | <1 | | | <2 |
| *Malus fusca* | Western crabapple | Tree | | | | | | | | | | <2 | |
| *Picea sitchensis* | Sitka spruce | Tree | | | | | | <2 | | | | <2 | |
| *Populus balsamifera* | Black cottonwood | Tree | | | | | | <2 | | | | 5 | |
| *Pseudotsuga menziesii* | Douglas fir | Tree | | | | | | | <2 | <2 | | | <2 |
| *Tsuga heterophylla* | Western hemlock | Tree | | | | | | | <1 | | | | |
| *Cornus sericea* | Red osier dogwood | Shrub | | | | | | 25 | | 5 | | 20 | |
| *Gaultheria shallon* | Salal | Shrub | | | | | | | 5 | <1 | | | <2 |
| *Holodiscus discolor* | Oceanspray | Shrub | | | | | | 2 | | | | <2 | |
| *Lonicera involucrata* | Black twinberry | Shrub | | | | | | 5 | | <2 | | <2 | |
| *Mahonia aquifolium* | Tall Oregon grape | Shrub | | | | | | <2 | <2 | | | 5 | |
| *Oemleria cerasiformis* | Indian plum | Shrub | | | | | | | <2 | <2 | | | 2 |
| *Philedelphus lewisii* | Mock orange | Shrub | | | | | | | | <1 | | <2 | |
| *Ribes sangineum* | Red flowering currant | Shrub | | | | | | | | <1 | 20 | | 15 |
| *Rosa nutkana* | Nootka rose | Shrub | | | | | | 30 | 20 | 10 | 5 | | 2 |
| *Rubus parviflorus* | Thimbleberry | Shrub | | | | | | | <2 | <2 | <2 | | <2 |
| *Symphoricarpos albus* | Snowberry | Shrub | | | | | | <2 | 5 | 20 | 10 | <2 | 5 |
| *Carex spp.** | Sedge* | Emergent | 60 | 10 | | | | | | | | | |
| *Carex stipata* | Sawbeak sedge | | | | 25 | | 20 | | | | | | |
| *Echinochloa crusgalli* | Large barnyard grass | Herb | | <1 | | | | | | | | | |
| *Eleocharus palustris* | Spike rush | Emergent | 1 | 25 | | 20 | | | | | | | |
| *Epilobium ciliatum* | Watson's willow-herb | Herb | | | | | <1 | | | | | | |
| *Juncus bufonius* | Toad rush | Emergent | | 20 | | | 5 | | | | | | |
| *Juncus ensifolius* | Dagger-leaf rush | Emergent | | | 25 | | | | | | | | |
| *Juncus tenuis* | Slender rush | Emergent | | | 10 | | 10 | | | | | | |
| | | | | | | | | | | | | | |
| *Lotus corniculatus* | Birdsfoot-trefoil | Herb | | <1 | <1 | | | | | | | | |
| *Polygonum spp.* | Smartweed | Emergent | | | <1 | | | | | | | | |
| *Potentilla anserina* | Silverweed | Emergent | | | <1 | | <1 | | | | | | |
| *Scirpus acutus / validus* | Hardstem / softstem bulrush | Emergent | 20 | 5 | | 20 | | | | | | | |
| *Scirpus atrocinctus* | | | | 10 | | | | | | | | | |
| *Scirpus microcarpus* | Small-fruited bulrush | Emergent | 1 | 25 | | | | | | | | | |
| *Trifolium pratens* | Red clover | Herb | | 2 | <1 | | | | | | | | |
| *Trifolium repens* | White clover | Herb | | 2 | <1 | <1 | <1 | | | | | | |
| *Veronica spp.* | Brooklime | Emergent | <1 | | | | | | | | | | |
| | | | | | | | | | | | | | |
| | Hydroseed grass cover | | | | | | | | 60 | | | | |
| | Bare Ground | | 18 | <5 | 40 | 60 | 65 | 50 | | 60 | 60 | 70 | 70 |

Planted sedges were *Carex lynbeyi*, *C. obnupta*, and *Carex stipata*. At the time of monitoring, sedges were generally not in flower and thus many could not be differentiated reliably based only on leaves.

**Table 2:** Baseline species richness and number of trees and shrubs within the 11 sampling plots at the Codiga Farms Restoration Site, Duwamish River, Tukwila Washington. Data collected July 22, 2004.

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ***Scientific Name*** | **Common Name** | **Stratum** | **1** | **2** | **3** | **4** | **5** | **6** | **7** | **8** | **9** | **10** | **11** |
| *Acer macrophyllum* | Bigleaf maple | Tree | | | | | | 2 | | | | 2 | |
| *Crataegus douglasii* | Douglas hawthorn | Tree | | | | | | 1 | 1 | 1 | | | 1 |
| *Malus fusca* | Western crabapple | Tree | | | | | | | | | | 1 | |
| *Picea sitchensis* | Sitka spruce | Tree | | | | | | 2 | | | | 1 | |
| *Populus balsamifera* | Black cottonwood | Tree | | | | | | 2 | | | | 4 | |
| *Pseudotsuga menziesii* | Douglas fir | Tree | | | | | | | 4 | 2 | 2 | | 1 |
| *Tsuga heterophylla* | Western hemlock | Tree | | | | | | | 2 | | | | |
| *Cornus sericea* | Red osier dogwood | Shrub | | | | | | 9 | | 3 | | 9 | |
| *Gaultheria shallon* | Salal | Shrub | | | | | | | 6 | 1 | | | 2 |
| *Holodiscus discolor* | Oceanspray | Shrub | | | | | | 5 | | | | 2 | |
| *Lonicera involucrata* | Black twinberry | Shrub | | | | | | 4 | | 2 | | 1 | |
| *Mahonia aquifolium* | Tall Oregon grape | Shrub | | | | | | 3 | 1 | | | 3 | |
| *Oemleria cerasiformis* | Indian plum | Shrub | | | | | | | 2 | 2 | 2 | | 3 |
| *Philedelphus lewisii* | Mock orange | Shrub | | | | | | 4 | | 1 | 1 | 2 | |
| *Ribes sangineum* | Red flowering currant | Shrub | | | | | | | 4 | 1 | 6 | | 6 |
| *Rosa nutkana* | Nootka rose | Shrub | | | | | | 15 | 13 | 5 | 5 | | 3 |
| *Rubus parviflorus* | Thimbleberry | Shrub | | | | | | | 4 | 3 | 4 | | 1 |
| *Symphoricarpos albus* | Snowberry | Shrub | | | | | | 3 | 6 | 8 | 6 | 2 | 5 |

Pacific Strapping Inc.
P.O. Box 3715
Seattle, WA 98124-3715
Tel: 800.255.7478, 206.262.9800
Fax: 206.262.9900

# PACSTRAP® P40RW Polyester Cord Strapping

## 1/2 INCH, REGULAR DUTY WOVEN

PRODUCT SPECIFICATION SHEET

| | |
|---|---|
| MATERIAL: | 100% POLYESTER CORD |
| NOMINAL WIDTH: | 1/2 INCH (12 mm) |
| THICKNESS: | .025 INCHES |
| BREAK STRENGTH: | 650 LBF MINIMUM |
| COIL LENGTH: | 3900 FEET (1300 YDS., 1188m) |
| COIL O.D.: | APPROX. 11 INCHES |
| COIL I.D.: | 3.0 INCH TUBE |
| COIL WIDTH: | 5.5 INCH TUBE |
| COIL WEIGHT: | 15 LBS. |
| PACKAGING: | 4 COILS PER CARTON |
| CARTON: | 12" x 12" x 22.5" (LxWxH) |
| CERTIFICATION: | THIS PRODUCT CONFORMS TO ASTM DESIGNATION: D 3950; STANDARD SPECIFICATION FOR STRAPPING, NONMETALLIC; TYPE IA, GRADE 2. |

# P A C S T R A P ® POLYESTER CORD STRAPPING

***The best of both steel and polypropylene all strapped into one!***

**P A C S T R A P ®** Polyester Cord Strapping outperforms steel and polypropylene in many industrial and agricultural strapping and tying applications. Manufactured from high tensile polyester yarns, **P A C S T R A P ®** can absorb sudden impacts that might break steel strapping. But unlike polypropylene, which has much higher elongation, **P A C S T R A P ®** can recover up to 99% of its original size. This combination of elongation and memory allows **P A C S T R A P ®** to absorb load shifting and maintain tension over time.

**P A C S T R A P ®** is unaffected by moisture, so it will not rust and discolor your load. It will not rot, mildew or become soggy, nor will it lose strength in extreme temperatures. Also, it is resistant to UV light and many chemicals and solvents.

**P A C S T R A P ®** is soft and pliable, so it is safe and easy to work with. It will not recoil when cut, and it has no sharp corners or edges. It can be reused or easily disposed.

**P A C S T R A P ®** can be tied by hand in the field or secured with a buckle or a seal using a hand-tensioner.

 (800) 255-7478

| | Cost | Elongation | Tension Decay | Impact Resistance | Notch Sensitivity |
|---|---|---|---|---|---|
| Steel | $$$ | Low | Lowest | Poor | High |
| Polyester Cord | $$ | Medium | Low | Excellent | Low |
| Polypropylene | $ | High | High | Fair | Medium |

**P A C S T R A P ®** Polyester Cord Strapping can be used to Palletize, Unitize, Tie, Bale, Bundle, Secure and Support items in Agriculture, Lumber, Marine and General Industry

Palletize and tie down heavy loads • unitize roof trusses, pressure treated lumber, decking material, millwork and other easily marred objects • tie fruit and nut tree limbs • support trees and vines • secure and support tarps • tie down cotton module covers • secure shrink wrap on boats and other large objects • hang carcasses • bundle pipes • band spools of wire and cable • bale cardboard and plastic for recycling • palletize transformers, medical equipment and explosives • palletize cartons of screws and bolts • band aluminum and wooden doors and windows • palletize automobile, aircraft and marine parts • bundle printed matter • palletize patio blocks, bricks and pavers • -- the possibilities are endless!

---

**STRONG • RESILIENT • SOFT • PLIABLE**
**ECONOMICAL • SAFE • VERSATILE**